JVC

SERVICE MANUAL

MODEL
JL-F50

FULLY AUTOMATIC
DIRECT DRIVE
TURNTABLE

No. 2411
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1. Specifications

TURNTABLE

Type	:	Fully Automatic Mechanism
Drive system	:	Direct Drive
Drive Motor	:	D.C. Servo Motor
Speeds	:	33-1/3 and 45 rpm
Wow and Flutter (WRMS)	:	Less than 0.03% (DIN)
Signal to noise ratio	:	More than 60dB (IEC-B) 70dB (DIN-B)
Pitch control range	:	More than ±2.5%
Platter	:	12-inch (31cm) Die-cast aluminum alloy

TONEARM

Type	:	Statically-balanced S-shaped tubular arm with JVC developed TH (Tracing Holed) balancing system and with tracking force dial of 0.1 gram steps
Effective arm length	:	220mm
Overhang	:	15mm
Applicable Tracking force range	:	0 to 3 grams
Applicable cartridge weight	:	14-24 grams (Included Headshell)
Tracking error	:	+3°.35', -0°.43'

CARTRIDGE (Except U.S.A. and Canada, U.K.)

Type	:	Moving Magnet (MD-1025)
Stylus	:	0.5 mil. diamond (DT-Z1TE)
Optimum tracking force	:	2 grams
Out put	:	3mV (1 kHz)
Frequency responce	:	10 – 25,000Hz
Separation	:	More than 25dB
Load Resistance	:	47 – 100k ohms
Compliance	:	25 x 10 cm/dyne

GENERAL

Dimensions	:	46.0(W) x 37.7(D) x 14.5(H) cm
Weight	:	7.5 kg

POWER SPECIFICATIONS

Countries	Line Voltage & Frequency	Power Consumption
U.S.A., CANADA	AC 120V, 60Hz	6.6 watts
CONTINELTAL EUROPE	AC 220V~, 50Hz	6.6 watts
U.K., AUSTRALIA	AC 240V~, 50Hz	6.6 watts
U.S. MILITARY MARKET	AC 100/120/220/240V Selectable, 50/60Hz	5.3 watts
OTHER AREAS	AC 100/120/220/240V Selectable, 50/60Hz	5.3 watts

2. Features

Fully automatic mechanism

* Automatic playing for records of all sizes – 30, 25, 17cm
* Repeat memory facility for automatic playing repetition. Set the dial to hear up to six repetitions of a record. Or, set it for infinite repetition.
* Automatic reject facility
  To stop record play at any point, depress the reject button, and the tonearm will automatically return to the rest.

New gimbal support arm

Outstanding tonearm sensitivity is assured, because bearings for clockwise/counterclockwise rotation are provided above and under the pivot bearing. Trackability is, thanks to the TH (Tracing Hold) tonearm system – the axis of the balance weight is positioned below its fulcrum – superb, and tracking characteristics are maintained even if a record is warped or if there is external vibration.

Direct drive

A newly developed 12-pole DC servomotor provides greatly improved performance. Highly accurate speed control and freedom from vibration are the performance features available only in the direct drive system.

Large high-inertia platter

Aluminium die-cast platter having a diameter of 31cm and weighing 1.6kg is employed. The stroboscope on the platter rim (33-1/3 r.p.m.) permits fine speed adjustment while a record is being played.

Diamong stylus

Good sound quality and long life are ensured by the diamond stylus having a tip radius of 0.5 mil.

Anti-skating mechanism

Anti-skating force can be adjusted corresponding to the tracking force.

Front type operating design

All operational controls, start button, reject button speed select button and tonearm cueing button, are arranged on the front panel for easy operation when the dust cover is closed.

Cueing

In manual record play the cueing device employs a timing motor to provide soft, uniform speed movement of the stylus tip as it is lowered onto and raised form the record surface, thus preventing damage to the record surface.

3. Block Diagram

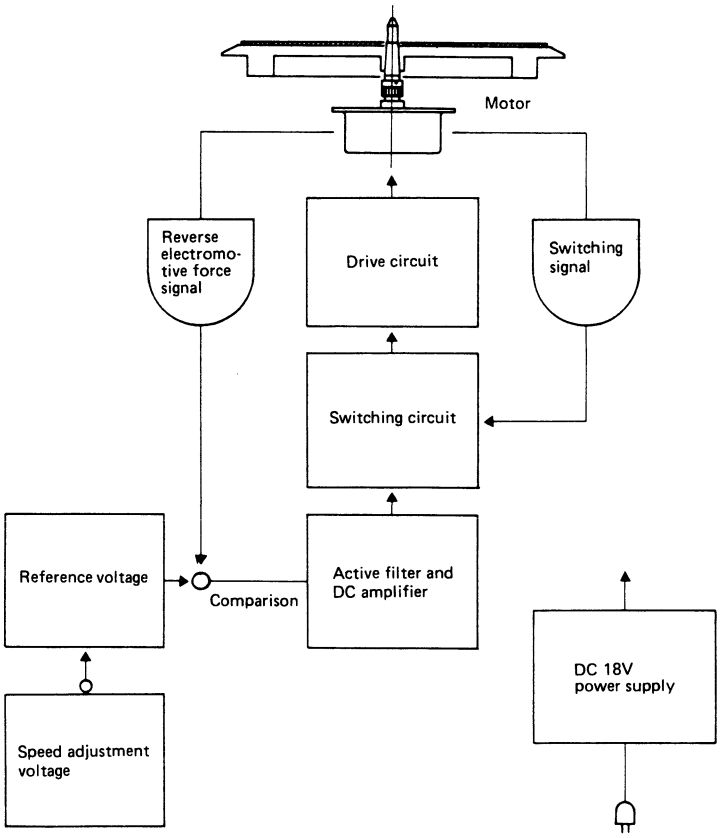


Fig. 1

* **Starting platter revolution (refer to Schematic Diagram on page 23)**

1) When the speed select knob is set to "33", switch S6 is closed (ON). For 45 rpm, switch S6 is opened. When the switch S6 is ON, the emitter of X13 is connected to the earth wire through the resisters for coarse and fine speed adjustment. The base of X13 is under a reference voltage of about 2V and the collector of X13 takes an earth level, causing the base of X12 to take an earth level at the same time.
2) This makes conductive, raising the emitter potential of X11 to make X10 conductive.
3) The conducting X10 causes X9 to become conductive. In this condition, the emitters of X5, 6 and X7, 8 are connected to the positive line, allowing the maximum current to flow.
4) Therefore, the output of the Hall elements inside the motor is amplified to the maximum degree, and transistors X1, 2 and X3, 4 connected in series to the drive coil are driven by this output, starting the revolution of the platter.
5) As the number of revolutions increases, the reverse electromotive voltage induced in the drive coil of the motor also increases gradually and, after being rectified by D1~D4 is stored by C5 and R14.
6) If current flows through the base of X12, the platter rotation is accelerated. If no base current flows, the rpm of the platter tends to decrease. The collector potential of X13 is determined by its base potential and emitter resistance. When the X13 collector potential drops by more than 0.6V from the reference +18V, current flows to the base of X12, starting accelaration of the platter rotation.
7) An inverse voltage ripple remains in the X12 transistor collector. This ripple, in nearly 2.2V sine wave form, is added to the direct current.
8) The Hall element switching output is amplified by X5 – X8 transistors to permit switching of X1 – X4 transistors. The collector voltage of transistors X1 – X4 which drives the motor is approximately 6.5Vp-p.
9) To ensure that the same amount of current flows to X1, 2 and X3, 4 voltage across R45 is fed back to X10. This prevents variations due to the components used.

* **Speed adjustment**

The rpm of the platter can be changed by varying the collector current of X13, which is varied by changing its emitter resistance. The rpm drops with reduced current. Therefore, lower speeds are obtained using higher resistances and vice versa.

* **Power supply**

The reference voltage of 18V is generated by a transistor 2SD325(E or D), and a Zener diode. The non-adjusted output voltage is about 0.6V lower than the voltage of the Zener diode.

4. Operation

4-(1) Construction diagram

Mechanical components

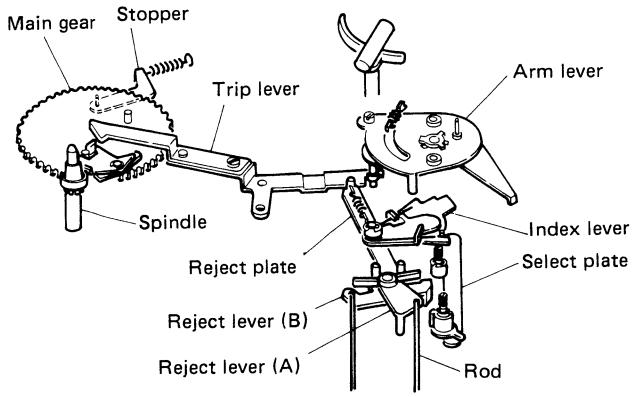


Fig. 2

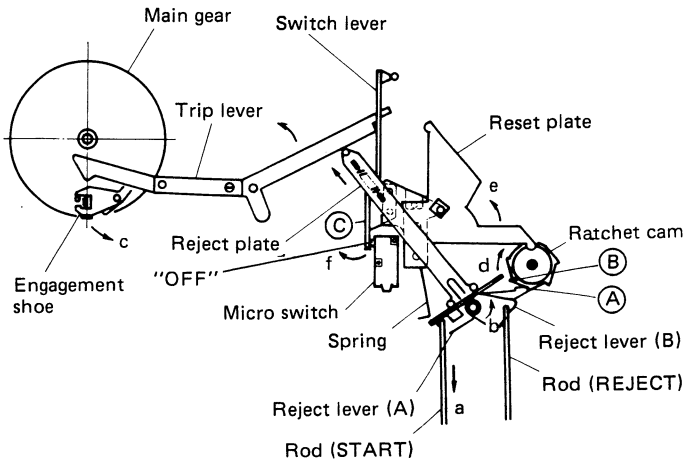


Fig. 4

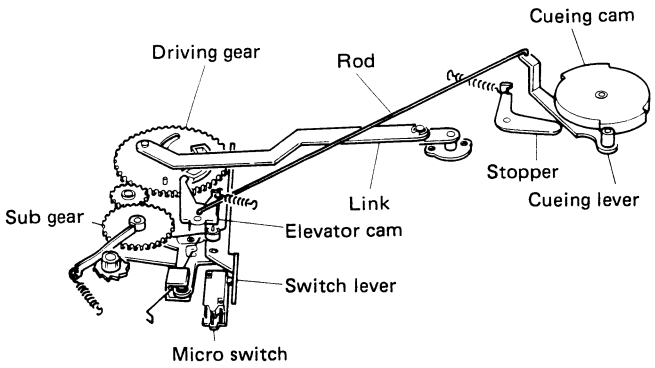


Fig. 3

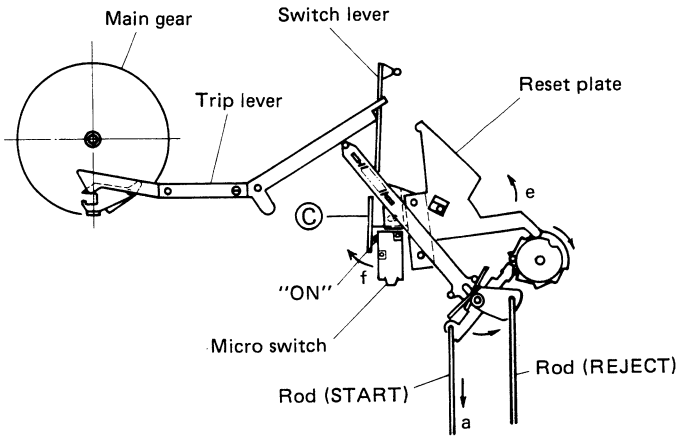


Fig. 5

4-(2) Start mechanism

When the start rod is pulled in the direction of arrow a, reject lever (A) connected to the rod turns in the direction of arrow b. This causes the reject lever to press against the reject plate, which in turn rotates engagement shoe in the direction of arrow c to change the cycle and start operation.

When reject lever (A) is pushed in the direction of arrow b, the same direction as in the starting operation, ratchet cam boss Ⓑ is moved in the direction of arrow d. The action causes the reset plate to be pushed in the direction of arrow e.

The above actions cause the switch lever (C) to move in the direction of arrow f and part Ⓒ to separate from the micro switch thus turning the micro switch on. (The micro switch in the separated state is conductive.) The operations described above are shown in Fig. 5.

4-(3) Lead-in mechanism

When the starting cycle begins and the main gear rotates, the driving gear is turned reciprocally by the link to reciprocate the elevator cam, as shown in Fig. 6.

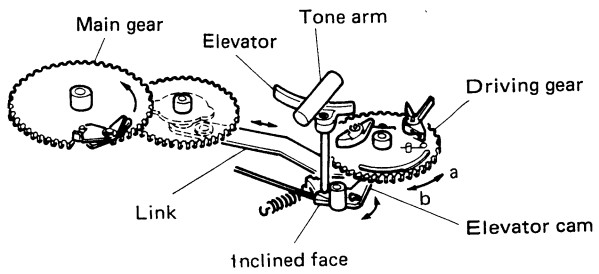


Fig. 6

As the elevator cam moves, its inclined face lifts the elevator, which in turn lifts the tonearm.
In Fig. 7, the lead-in lever is moved in the direction (a) by the counterclockwise rotation (b) of the driving gear, as shown in Fig. 6. As a result, the lead-in lever passes the arm lever stud (A) without touching it. Therefore, the arm lever does not move. During the next process shown in Fig. 8, the lead-in lever strikes against the reset plate and is pushed back in the direction (a). When the driving gear returns in the clockwise direction (B), this time the lead-in lever pushes the arm lever stud (B), and the arm lever stud is moved in the direction of the arrow, as shown in Fig. 9. This finishes the final stage of the lead-in operation.

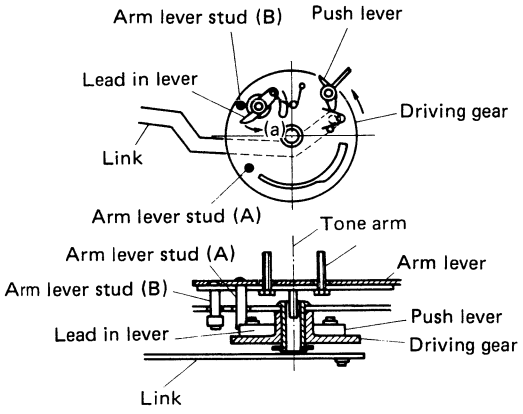


Fig. 7

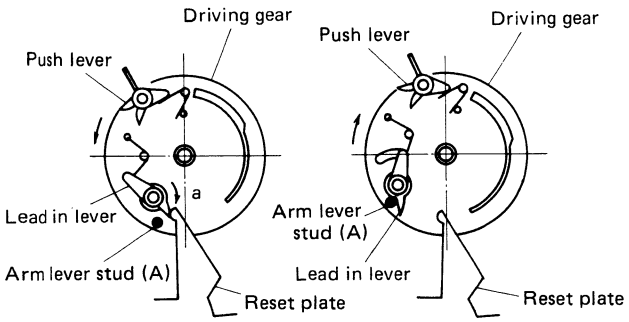


Fig. 8 Fig. 9

The stylus is positioned at the beginning of a record according to the record size (17, 25, or 30cm) chosen with the Record Size Select knob. The stylus position is determined by one of three steps on the index lever shown in Fig. 10. Part Ⓐ of the arm lever engages the corresponding step on the index lever.
Turning this eccentric adjustment screw will move the arm lever to fine-adjust the stylus lead-in position.

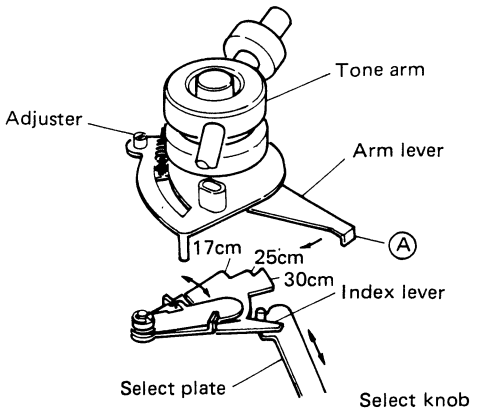


Fig. 10

4-(4) Return cycle starting mechanism

The relationship between the notch in the main gear and the platter gear while a record is being played is shown in Fig. 11. In this condition the main gear does not rotate as the platter rotates because the platter gear and main gear are not engaged. As playing proceeds, however, the arm lever presses the trip lever to gradually more the lower trip and the engagement shoe on the main gear.

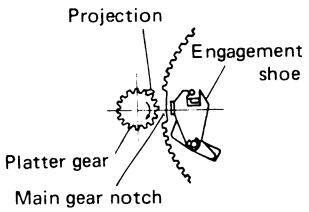


Fig. 11

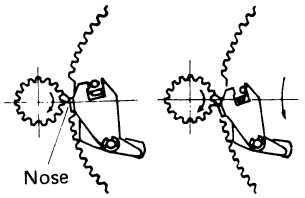


Fig. 12 Fig. 13

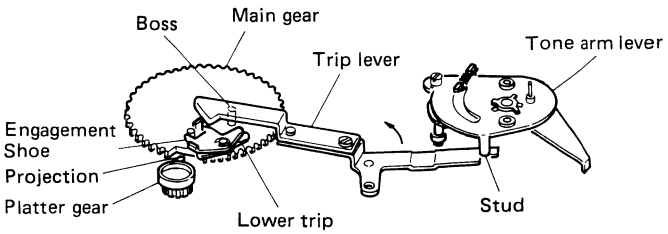


Fig. 14

The relationship between the engagement shoe and the platter gear comes to a state shown in Fig. 12. In this condition, during the time in which the pitch of the grooves is small, the movement of the engagement shoe is small. The engagement shoe is thus pushed back by the nose of the engagement shoe, the main gear being still.
When the stylus comes into the lead-out groove having a large pitch at the end of a record, the movement of the engagement shoe becomes larger than the reverse movement caused by the projection nose, entering the state which is shown in Fig. 13, where the projection presses the engagement shoe to cause the main gear to rotate.

When the main gear notch moves away, both the gears come into engagement, tripping the returning cycle.
After one complete revolution of the main gear, it will return to the position as shown in Fig. 11. The main gear will stop rotating while the platter gear is still turning.
As the main gear turns, the engagement shoe and the lower trip are returned by the outer edge of the platter gear to the original position just before the rotation of the main gear is finished. The trip lever also returns to its original position on the boss on the face of main gear halfway through the main gear rotation.

4-(5) Repeat mechanism

Setting the REPEAT knob to one of the positions "1" through "6" will cause the tonearm to return from the end of record to the beginning lead-in position and play it again. The same process will be repeated up to six times, depending on the setting. Setting the knob to "R" will cause the tonearm to play the record over and over again endlessly.

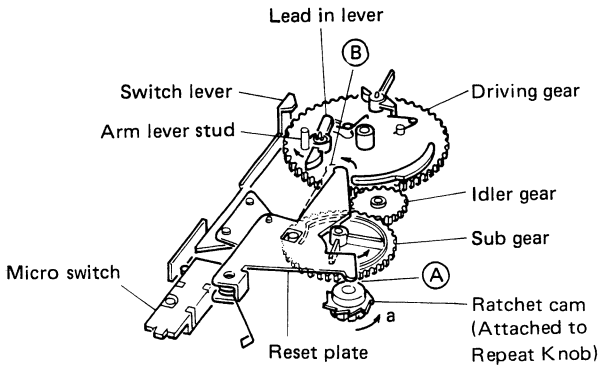


Fig. 15

As shown in Fig. 15, when the ratchet cam is turned in the direction of arrow (a) (toward the position "R" on the REPEAT knob), the part Ⓐ of the reset plate is pushed away by the outer circumference of the ratchet cam until its part Ⓑ is moved as far as the dotted line. Thus, the lead-in lever on the driving gear is always returned by the reset plate and pushes the arm lever stud back to bring the arm lever to the lead-in position, and the record is played again. At the "R" position the hook on the sub gear passes over the toothless section of the ratchet cam, so the cam does not turn.
If the ratchet cam is set to one of the positions "1" through "6" on the REPEAT knob, the ratchet cam and the hook on the sub gear engage after every time one record has been played, as shown in Fig. 16.
Thus the cam turns one step for each cycle. After completion of the specified number of cycles the ratchet cam and hook do not engage, and the reset plate returns to the position as shown in Fig. 15. As a result, the lead-in position. The tonearm is returned to the arm rest, and the power is turned off when the switch plate presses the micro switch.

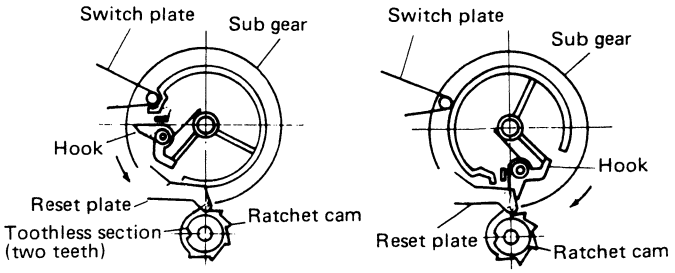


Fig. 16

4-(6) Reject mechanism

When the reject button is depressed in the play mode, the reject rod moves in the direction of arrow (a). This movement causes the reject plate, trip lever and engagement shoe to move in the direction of arrow (c), which changes the cycle and start operation.

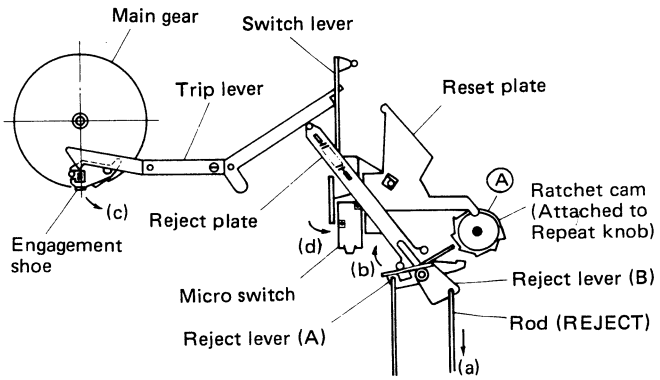


Fig. 17

If the REPEAT knob is at "1", the reset plate engages with the section (A) of the ratchet cam, and the switch lever moves in the direction of (d) to push the micro switch, turning the power off.

4-(7) Cueing mechanism

Depressing the "UP" button actuates the micro switch and rotates the cueing cam. When the cueing lever is pushed by cam Ⓐ, the rod moves in the direction of arrow a, thus rotating the elevator cam.
The elevator is raised by cam C.
The cueing cam makes a quarter rotation to turn the micro switch off with cam Ⓑ.
Depressing the "DOWN" button causes the cueing cam to rotate the same as in lifting. The rod then moves in the direction of arrow b and the elevator is lowered.

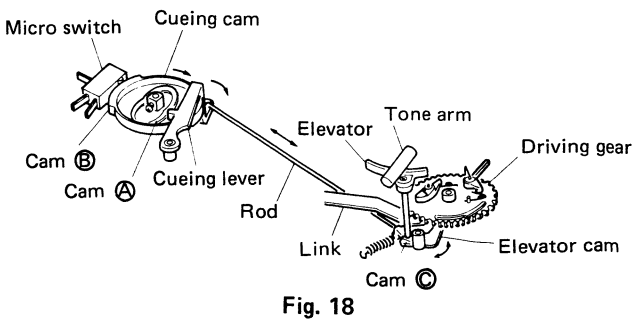


Fig. 18

5. Adjustment Procedures

5-(1) Lead-in adjustment

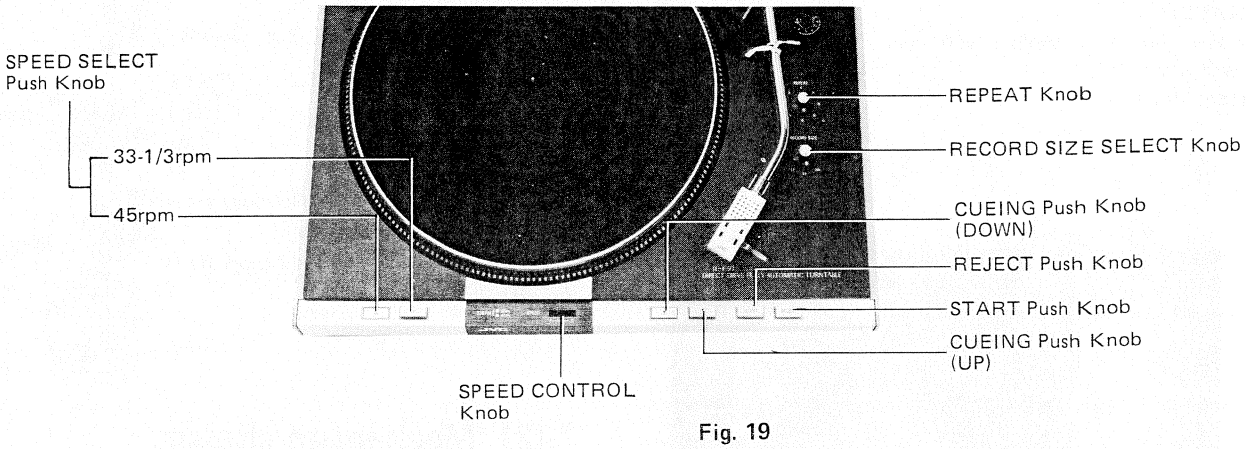


Fig. 19

Normal lead-in count range	Record size
7 – 29	17cm (7")
13 – 38	25cm (10")
5 – 34	30cm (12")

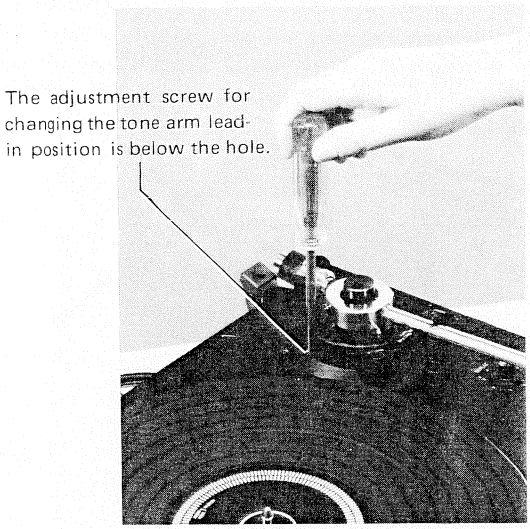


Fig. 20

The stylus lead-in position has been adjusted at the factory so that the stylus lands correctly onto the lead-in groove of a record. However, the position may need adjustment if the tonearm is replaced. Follow these steps to adjust the lead-in position:

1. Put the 30cm JVC test record (RG324) on the platter.
2. Set the RECORD SIZE select knob to "17", and start automatic playing. If the stylus comes in contact with the test record while the voice is counting in a range between 7 and 29, the lead-in position is correct. If not, turn the adjustment screw with a screwdriver clockwise to move the lead-in position towards the center of the record, where the lead-in count increases, or counter-clockwise to move the lead-in position towards the outer rim of the record, when the lead-in count decreases.

Note: The normal lead-in count range is shown below. If you adjust so that the lead-in count is 18 for a 17cm record the lead-in count for both 25cm and 30cm records will be automatically set within the normal range.

5-(2) Lead-out adjustment

The correct lead-out adjustment has also been made at the factory, but its adjustment is necessary after replacement of a tonearm or for other reasons, follow the steps below. Fig. 21 shows the mechanism after removal of the platter.

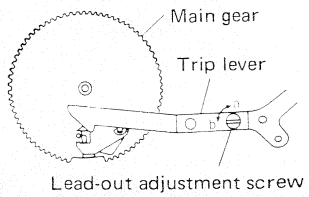


Fig. 21

* **If lead-out does not occur:**
Play the 17cm JVC test record (RG652) having a lead-out groove pitch of 3mm. If the change cycle does not begin when the stylus reaches the lead-out groove, turn the lead-out adjustment screw clockwise in the direction of arrow (a) as shown in Fig. 21.

* **If lead-out occurs too soon:**
If the change cycle begins before the stylus comes to the lead-out groove of the 17cm JVC test record (RG653, back side of RG652) turn the screw counterclockwise in the direction of arrow (b).

Caution: Unplug the power cord first.

1. Clamp the tonearm to the arm rest.
2. Remove the dust cover.
3. Remove the rubber mat, the platter, and the belt.
4. Turn the set upside down, and place it on blocks to protect the tonearm assembly, spindle shaft and pulley.
5. After removing the signal and power cord assemblies from the bottom board, remove the eight screws fixing the bottom board.

6. Removal of Chassis Base Ass'y

Procedure:
Remove the all screws (Item No. 1 through No. 14) arrowd in Fig. 22.
Bottom View

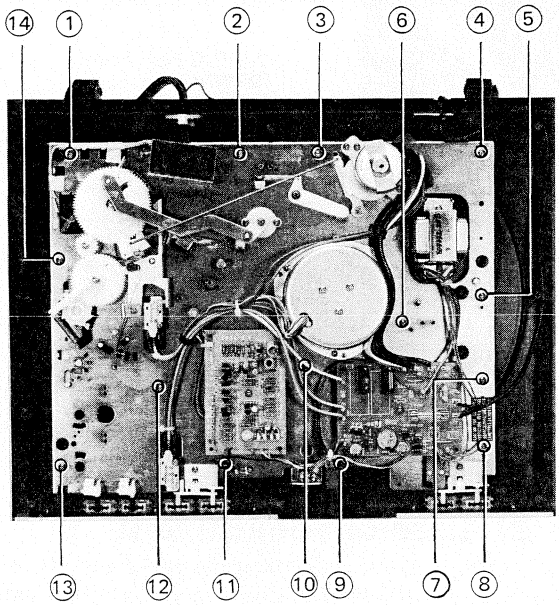


Fig. 22

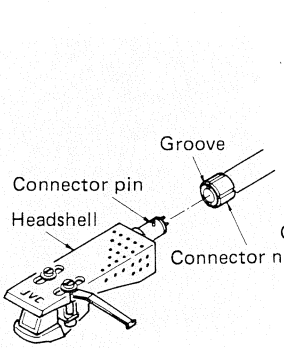


Fig. 23

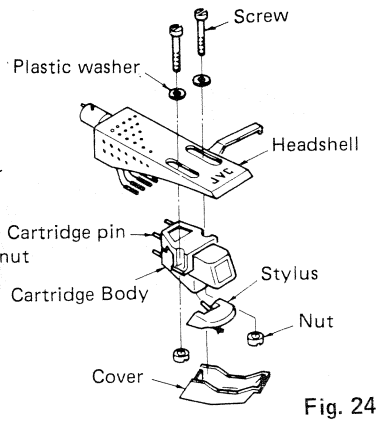


Fig. 24

7-(2) Mechanism chassis

When you replace the entire mechanism (or the driving gear only), be sure to check that the lead-in lever attached to the driving gear has been returned in the direction of arrow (a) as shwon in Fig. 25. (The lead-in lever faces in the direction of arrow (b), the mechanism may malfunction or be damaged.)

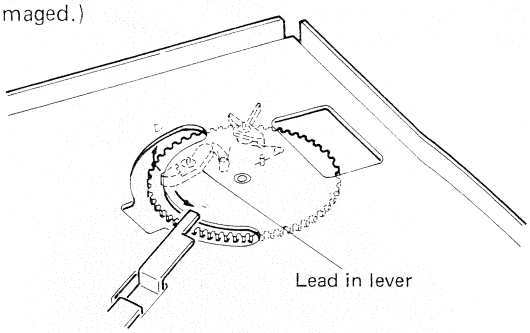


Fig. 25

7. Replacement of Parts

7-(1) Cartridge

1. Unscrew the connector nut to remove the headshell.
2. Remove the two long screws on the headshell which hold the cartridge.
3. Connect the lead wires of the headshell to the new cartridge, being careful to match the polarities correctly. Polarity and wire colors are as follows:
   White(+) ..... L Red (+) ..... R
   Blue(–) ..... LE Green (–) ..... RE
4. Attach the cartridge to the headshell squarely, and gently tighten the screws.
5. Set the tonearm cueing lever to "DOWN", and then bring the sytlus tip to the overhang indicator by sliding the cartridge back and forth.
   After the adjustment, fix it firmly.
6. After attaching the cartridge, slide the headshell into the tonearm with the connector pin fitting in the groove. Tighten the connector nut.
7. Be sure to adjust the tracking force and lead-in position after replacing the cartridge.

7-(3) Voltage setting

(for U.S. Military Market and Other Areas)

Although this set is pre-set for the use on your area's AC line voltage without any re-adjustment, it can be used on all AC voltages in the world through following adjustments.

To change the voltage, remove a bottom board, and replace the plug so that the required voltage, marked on the socket, may come out in the window of the voltage selector plug. Do not forget to replace the fuse as well with one of appropriate capacity.

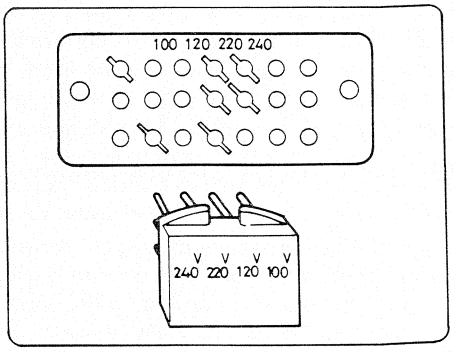


Fig. 26

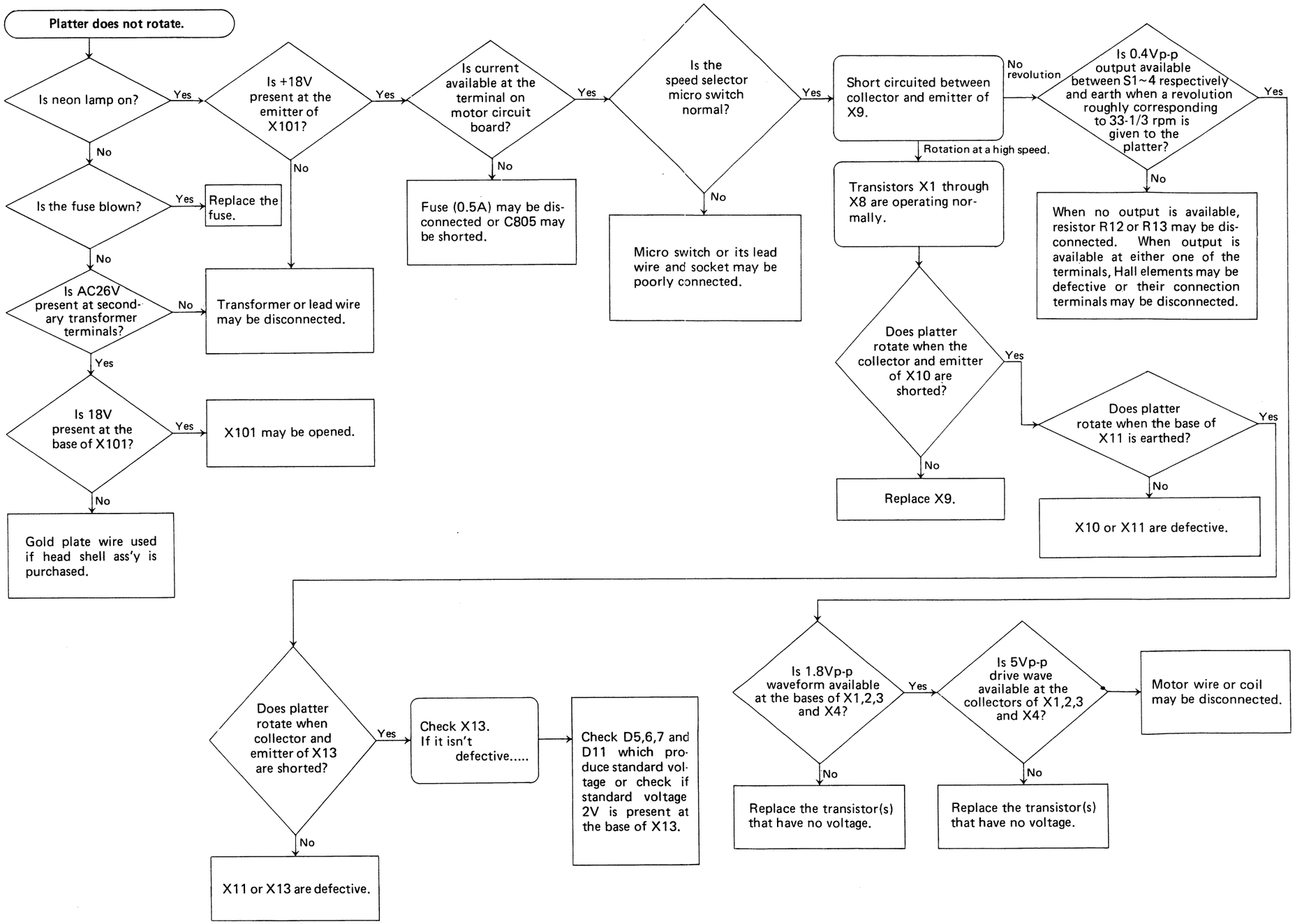
8. Troubleshooting

8-(1) Table of Troubleshooting

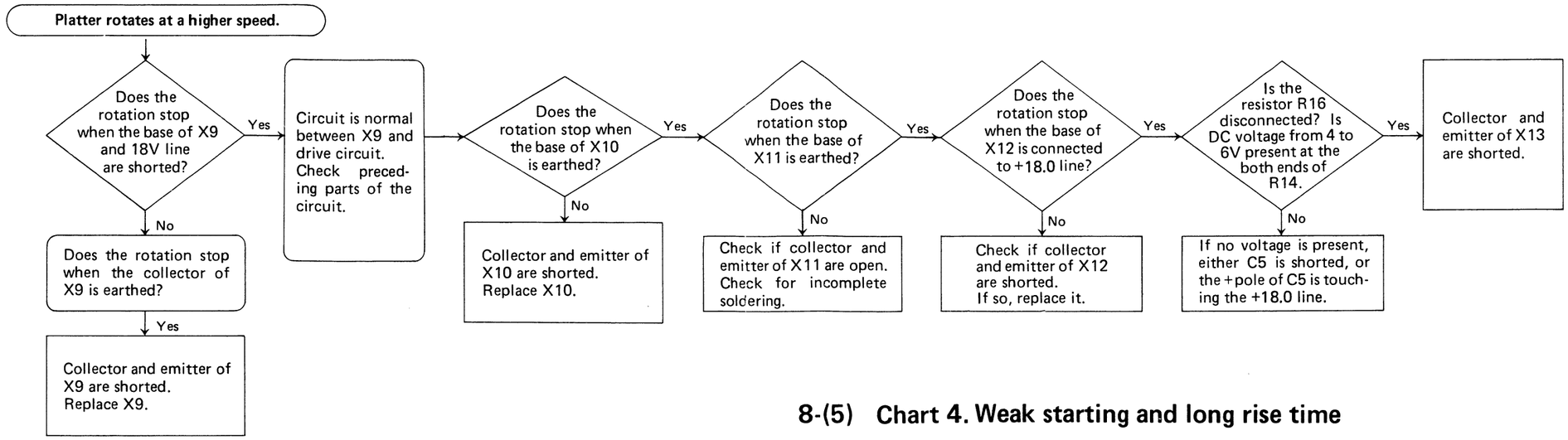
Sympton	Cause	Remedies
Platter does not rotate when tonearm is moved to manually or by automatic start operation.	1. Motor is not powered. 2. Motor and motor circuit are defective. 3. Switch lever remains in contact with the switch.	* Check if the power cord is plugged in and the fuse is blown when the neon lamp also does not light. * Check the transistors in the power circuit. (Check if 18V is availabie at the motor terminals.) * Check voltage of each part of the servo circuit board. * Adjust the switch lever for correct clearance.
Platter speed is not correct.	1. The circuit board is out of fine adjustment.	* Adjust so that it rotates correctly for both 33 or 45 rpm.
Motor rotates at a high speed without being controlled by the servo system.	1. The printed pattern is short-circuited. (Capacitors, particularly C5 should be checked carefully.	* Separate the short-circuited points.
Motor rotates unbalancedly.	1. Platter is not correctly fitted on the shaft. 2. Any one of transistors X1-X8 is defective.	* Fit the platter on the motor shaft correctly. * Check voltage for X1-X8.
Platter stops at a point when held by hand. (Dead point occurs.)	1. Either one of the Hall elements is defective. 2. Input or output of the Hall elements is incompletely soldered.	* Replace * Solder it completely.
Tonearm does not lead-in. (Player does not start.)	1. Platter does not rotate. 2. Change cycle does not start. 3. Lead-in lever on driving gear is turned toward the outside of the gear and is blocked by the arm lever stud.	* Refer to the above-mentioned column. * Check that the engagement shoe operates smoothly, and that it is pushed away fully when the start knob is pulled. * Set lead-in lever to the proper inward position.
Tonearm lead-in position goes out of adjustment.	1. Arm lever adjuster is not firmly fixed, allowing movement.	* Be sure to tighten the knurled washer to lock the adjuster.
Arm lifter lever moves incorrectly.	1. The lead wires of the tonearm are too tight or tangled. 2. Elevator slips on the tonearm pipe.	* Slacken the lead wires to avoid any unwanted force on the tonearm pivot. * Wipe the elevator face.
Tonearm does not stop at the correct position of a record, and moves to the inside.	1. Index lever does not operate correctly.	* Check that the index lever operates smoothly under the action of the spring.
Change cycle will not stop.	1. Trip lever and engagement shoe of the main gear malfunction.	* Check that trip lever returns after completing the change cycle, and that the engagement shoe moves smoothly and freely with its own weight.
No sound is reproduced while playing.	1. Cartridge is defective. 2. Wiring is not correct. (Live and earth are connected inversely.) 3. Stylus is defective. 4. Amplifier is defective.	* Replace. * Check the wiring. * Replace.

Sympton	Cause	Remedies
Stylus does not follow the groove correctly.	1. Dust or foreign matter is in the record groove. 2. Stylus is dirty or defecitve. 3. Lead wires in tonearm are tangled or too tight. 4. Tracking force is abnormal. 5. Tonearm bearings have too much friction.	* Clean. * Clean or replace. * Slacken the wires. * Adjust. * Replace tonearm.
Motor rumble is heard while playing.	1. Motor is defective. 2. Transformer is defective.	* Bearing shake is excessive. Replace it. * Check if the transformer is floating.
Tonearm does not lead-out.	1. The lead-out groove is not standard. 2. Stylus does not advance.	* It may not lead out when old or non-standard records such as film records are used. * Lead-out will not occur if the pitch of the lead-out groove is less than 3mm. * Check if the tracking force is correct. * Check if trip mechanism does not operate smoothly. * Check if the stylus tip is damaged or dirty.
Reject operation does not work.	1. Engagement shoe is not pushed away fully.	* Check the trip mechanism.
Repeat operation does not work.	1. Switch plate malfunctions, and switch turns off.	* Check that switch plate and reset palte operate smoothly.
Platter does not shut off.	1. REPEAT knob is set for repeat playing.	* Set the knob to "0".
Power does not turn off after reject operation with the REPEAT knob at "0".	1. Switch is defective. 2. Switch button is not fully pressed by the switch lever.	* Replace. * Adjust so that lever fully presses the switch button.
Cueing device is defective	1. Switch is defective. 2. Switch lever or cueing cam does not apply sufficient pressure to operate the switch. 3. Timing motor is defective.	* Replace * Replace the timing motor.

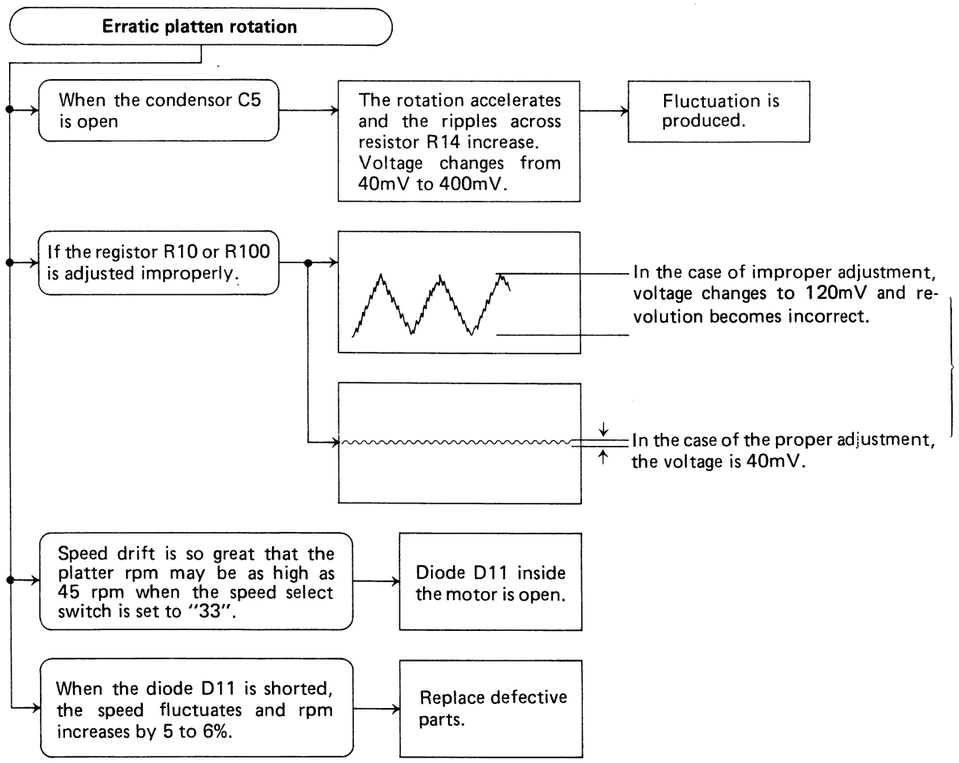
8-(2) Chart 1. Platter does not rotate


Platter does not rotate.
Is neon lamp on?
Yes
No
Is the fuse blown?
Yes
Replace the fuse.
No
Is AC26V present at secondary transformer terminals?
No
Transformer or lead wire may be disconnected.
Yes
Is 18V present at the base of X101?
Yes
X101 may be opened.
No
Gold plate wire used if head shell ass'y is purchased.
Is +18V present at the emitter of X101?
Yes
No
Is current available at the terminal on motor circuit board?
Yes
No
Fuse (0.5A) may be disconnected or C805 may be shorted.
Is the speed selector micro switch normal?
Yes
No
Micro switch or its lead wire and socket may be poorly connected.
Short circuited between collector and emitter of X9.
No revolution
Rotation at a high speed.
Transistors X1 through X8 are operating normally.
Is 0.4Vp-p output available between S1~4 respectively and earth when a revolution roughly corresponding to 33-1/3 rpm is given to the platter?
Yes
No
When no output is available, resistor R12 or R13 may be disconnected. When output is available at either one of the terminals, Hall elements may be defective or their connection terminals may be disconnected.
Does platter rotate when the collector and emitter of X10 are shorted?
Yes
No
Replace X9.
Does platter rotate when the base of X11 is earthed?
Yes
No
X10 or X11 are defective.
Does platter rotate when collector and emitter of X13 are shorted?
Yes
Check X13. If it isn't defective.....
Check D5,6,7 and D11 which produce standard voltage or check if standard voltage 2V is present at the base of X13.
No
X11 or X13 are defective.
Is 1.8Vp-p waveform available at the bases of X1,2,3 and X4?
Yes
No
Replace the transistor(s) that have no voltage.
Is 5Vp-p drive wave available at the collectors of X1,2,3 and X4?
No
Replace the transistor(s) that have no voltage.
Motor wire or coil may be disconnected.

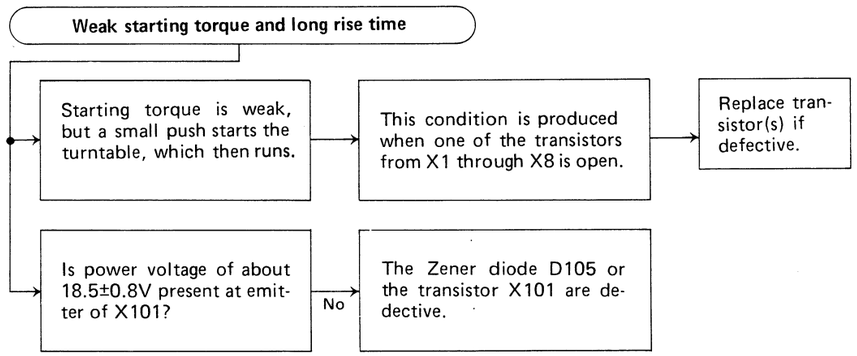
8-(3) Chart 2. Platter rotates at high speed


Platter rotates at a higher speed.
Does the rotation stop when the base of X9 and 18V line are shorted?
Yes
No
Circuit is normal between X9 and drive circuit. Check preceding parts of the circuit.
Does the rotation stop when the collector of X9 is earthed?
Yes
Collector and emitter of X9 are shorted. Replace X9.
Does the rotation stop when the base of X10 is earthed?
Yes
No
Collector and emitter of X10 are shorted. Replace X10.
Does the rotation stop when the base of X11 is earthed?
Yes
No
Check if collector and emitter of X11 are open. Check for incomplete soldering.
Does the rotation stop when the base of X12 is connected to +18.0 line?
Yes
No
Check if collector and emitter of X12 are shorted. If so, replace it.
Is the resistor R16 disconnected? Is DC voltage from 4 to 6V present at the both ends of R14.
Yes
No
If no voltage is present, either C5 is shorted, or the + pole of C5 is touching the +18.0 line.
Collector and emitter of X13 are shorted.

8-(4) Chart 3. Erratic platter rotation


Erratic platten rotation
When the condensor C5 is open
The rotation accelerates and the ripples across resistor R14 increase. Voltage changes from 40mV to 400mV.
Fluctuation is produced.
If the registor R10 or R100 is adjusted improperly.
In the case of improper adjustment, voltage changes to 120mV and revolution becomes incorrect.
In the case of the proper adjustment, the voltage is 40mV.
Re-adjustment is required.
Speed drift is so great that the platter rpm may be as high as 45 rpm when the speed select switch is set to "33".
Diode D11 inside the motor is open.
When the diode D11 is shorted, the speed fluctuates and rpm increases by 5 to 6%.
Replace defective parts.

8-(5) Chart 4. Weak starting and long rise time


Weak starting torque and long rise time
Starting torque is weak, but a small push starts the turntable, which then runs.
This condition is produced when one of the transistors from X1 through X8 is open.
Replace transistor(s) if defective.
Is power voltage of about 18.5±0.8V present at emitter of X101?
No
The Zener diode D105 or the transistor X101 are dedective.

9. Exploded Views and Parts List

9-(1) Player Ass'y

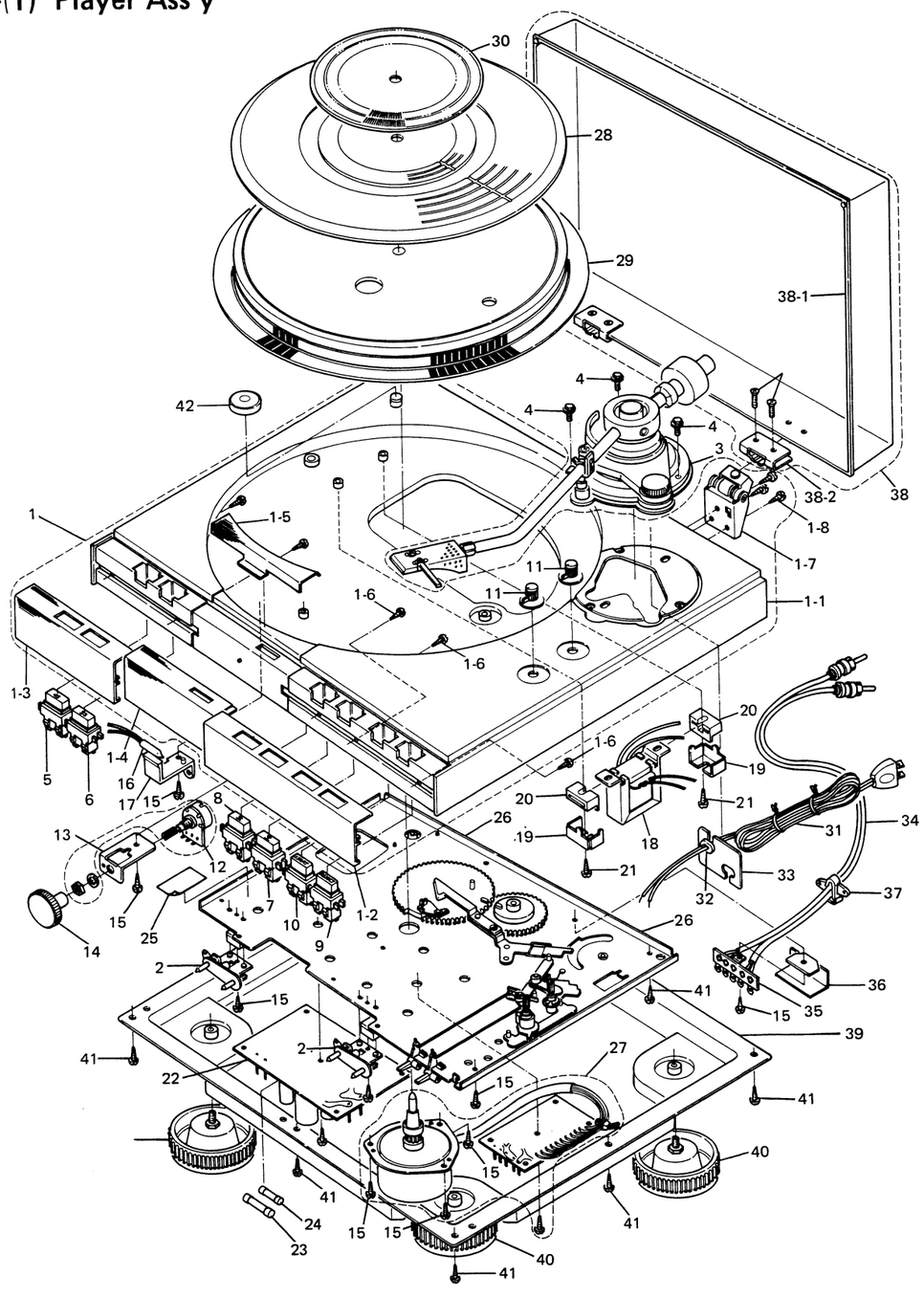


Fig. 27

No.	Parts No.	Description
1	*See page 17	Cabinet Ass'y (Refer to table 1)
1-1	*See page 17	Cabinet (Refer to table 1)
1-2	*E34980-001	Front Panel (A)
1-3	*E34981-001	Front Panel (B)
1-4	*E34983-001	Center Panel
1-5	*E61690-001	Lamp Cover
1-6	SPSP3005NS	Screw
1-7	E60989-001	Hinge Ass'y
1-8	SSSB3010M	Screw
2	*E61709-001	Change Lever Ass'y
3	*See page 17	Tonearm Ass'y (Refer to table 1)
4	E61850-001	Screw
5	*E35024-001	Push Knob Ass'y ("45")
6	*E35024-002	" ("33")
7	*E35024-003	" ("UP")
8	*E35024-004	" ("DOWN")
9	*E35024-005	" ("REJECT")
10	*E35024-006	" ("START")
11	E61686-001	Knob Ass'y
12	QVF1A2B-013	Variable Resistor
13	*E61712-001	Volume Bracket
14	*E61713-001	Volume Knob
15	SBSB3008Z	Tapping Screw
16	*QLN3104-003	Neon Lamp
17	*E61763-001	Lamp Holder
18	See page 17	Power Transformer (Refer to table 1)
19	E61825-001	Holder
20	E61824-001	Cushion
21	SBSB3016Z	Tapping Screw
22	*See page 17	P.C. Board Ass'y (Refer to table 1)
23	"	Fuse (Refer to table 1)
24	"	" (")
25	"	Fuse Label (Refer to table 1)
26	*F5001	Base Ass'y (")
27	*MC933A	Motor Ass'y
28	*See page 17	Turntable Covering (Refer to table 1)
29	*E22340-001	Turntable
30	E61136-002	Storobo Plate
31	See page	Power Cord (Refer to table 1)
32	QHS3876-162	Cord Stopper
33	*E61695-001	Cord Stopper Plate
34	G30062-5	Signal Cord Ass'y
35	QML1310-051	Lug Strip Ass'y
36	E60090-002	Shield Cover
37	E33944-001	Cord Stopper
38	E34993-004	Dust Cover Ass'y
38-1	E10156-002	Dust Cover
38-2	E60990-001	Lock Plate
38-3	SHSP3010RS	Screw
39	*See page 17	Bottom Board Ass'y (Refer to table 1)
40	"	Foot Ass'y (Refer to table 1)

No.	Parts No.	Description
41	SBSB3010Z	Tapping Screw
42	E48820-001	EP Adaptor
91	*See page 17	Timing Motor (Refer to table 1)
92	*E61705-001	Motor Holder
93	*E34986-001	Cueing Cam
94	SBSB3006Z	Tapping Screw
95	See page 17	Micro S.W (Refer to table 1)
96	"	"
97	"	"
98	QSM1V01-003	"
99	LPSP3010ZS	Ass'y Screw

9-(2) Mechanism Ass'y

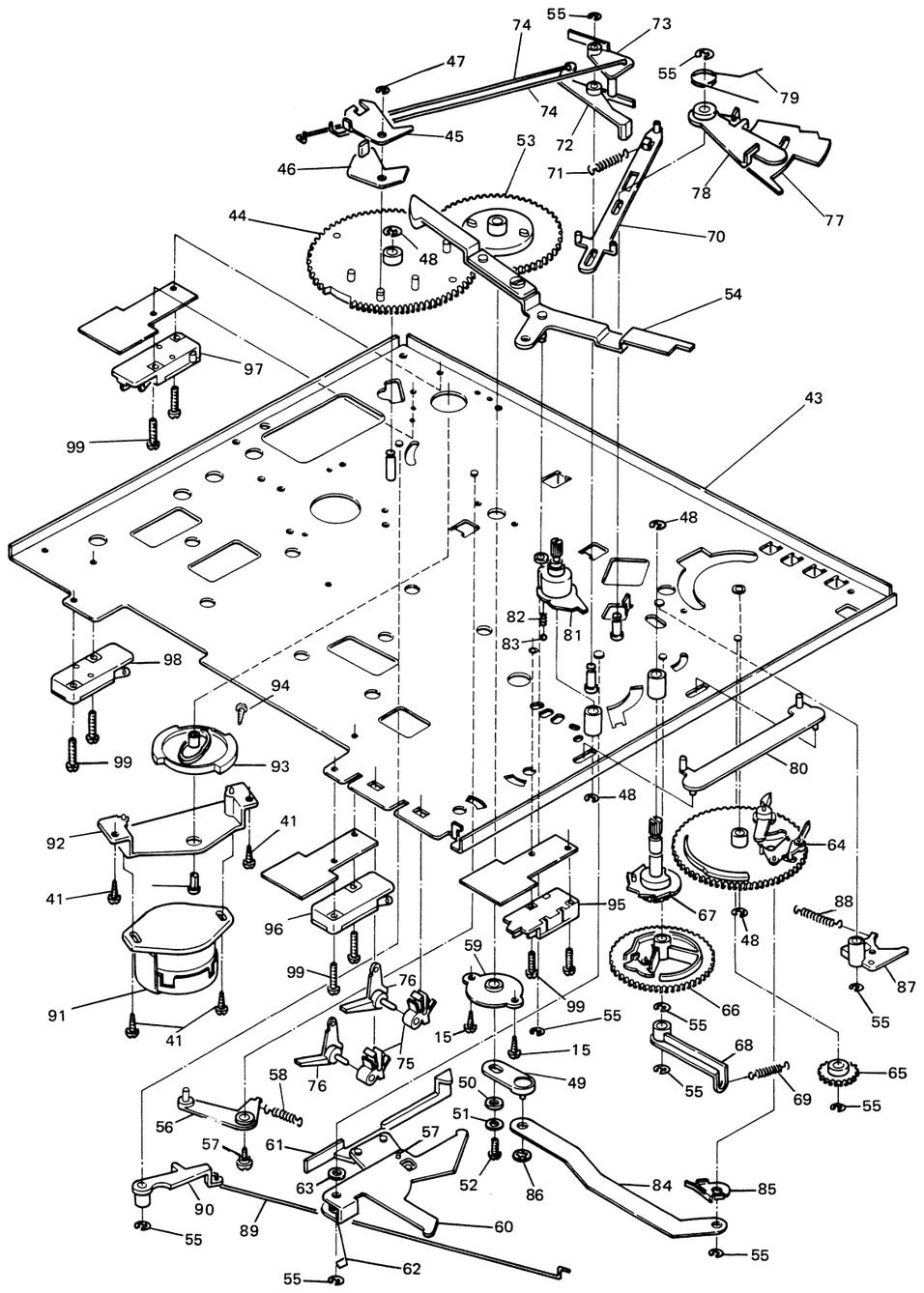


Fig. 28

No.	Parts No.	Description
43	*E10175-002	Base Sub Ass'y
44	E21913-002	Main Gear Ass'y
45	E49627-001	Engagement Pawel
46	E60380-001	Lower Trip Pawel
47	REE2000	"E-typed" Ring
48	REE5000	"E-typed" Ring
49	E60381-001	Lever
50	E60844-001	Spacer
51	WNS3000N	Washer
52	LPSP3008ZS	Ass'y Screw
53	E60449-001	Flywheel Gear Ass'y
54	E34234-001	Trip Ass'y
55	REE3000	"E-typed" Ring
56	E60383-001	Stopper
57	G41507-001	Tapping Screw
59	E60384-001	Spring
60	E60395-001	Reset Plate
61	E60394-001	Switch Plate Ass'y
62	E60396-001	Spring
63	WNS4000N	Washer
64	E34236-002	Driving Gear Ass'y
65	E60400-001	Idler Gear
66	E60405-002	Sub Gear Ass'y
67	E34238-001	Ratchet Cam Ass'y
68	E60407-001	Ratchet Lever
69	E60489-001	Spring
70	E60415-001	Reject Plate
71	E60416-001	Spring
72	*E61699-001	Reject Lever (A)
73	*E61700-001	" (B)
74	E61701-001	Reject Rod
75	E61702-001	Rod Holder
76	E61703-001	Push Lever
77	E60425-001	Index Ass'y
78	E60426-002	Lever
79	E60427-001	Spring
80	E60422-003	Select Plate
81	E60421-001	Select Lever Shaft Ass'y
82	E60488-001	Spring
83	G41505-5	Steel Ball
84	E34237-002	Link
85	E60900-001	Cushion Spring
86	G4942-4	Speed Nut
87	E60390-002	Elevator Cam
88	*E49596-001	Spring
89	*E61704-001	Rod
90	*E61706-001	Cueing Lever

9-(3) Tonearm Ass'y

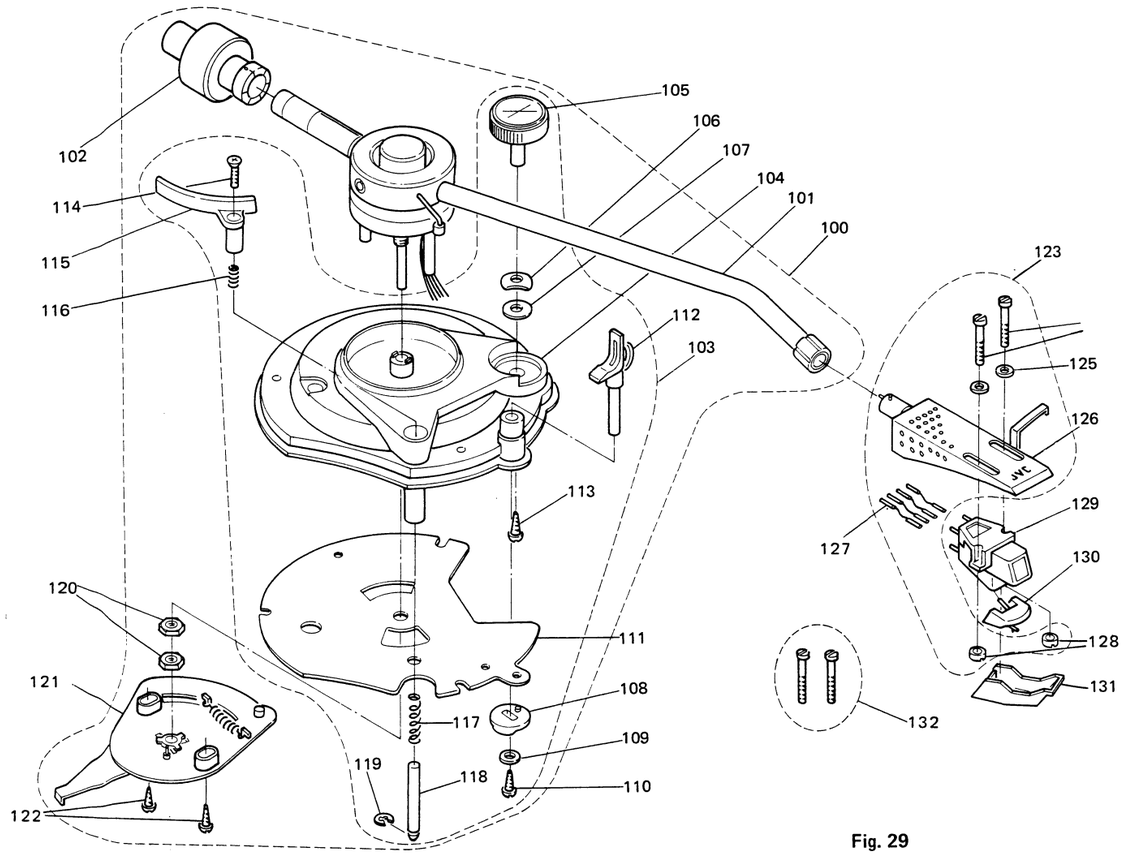


Fig. 29

No.	Parts No.	Description
100	*E22324-002	Tonearm Ass'y
101	*E21985-004	Arm Ass'y
102	*E35050-001	Main Weight Ass'y
103	E22377-001	Tonearm Base Ass'y
104	E22392-001	Tonearm Base Sub Ass'y
105	E61743-001	Anti-skating Knob Ass'y
106	E49602-002	Washer
107	G4517-1	Thrust Washer
108	E34258-001	Anti-skating Cam
109	WSS2000Z	Washer
110	SBSB2005Z	Tapping Screw
111	E35028-001	Plate
112	E60326-002	Arm Rest Ass'y
113	SBSB2608Z	Tapping Screw
114	SSSP3016MS	Screw
115	E60475-001	Elevator Ass'y
116	E49649-001	Spring

No.	Parts No.	Description
117	E61194-001	Spring
118	E49655-005	Elevator Shaft
119	REE3000	"E-typed" Ring
120	G5053	Nut
121	E61693-002	Arm Lever Ass'y
122	SBSB3008Z	Tapping Screw
123	PH-9LC	Headshell Ass'y
124	E60502-008	Screw
125	EG82971	Washer
126	E34990-002	Headshell Body
127	E60501-001	Wire Ass'y
128	E60503-001	Nut
129	See right table	Cartridge
130	"	Needle Ass'y
131	"	Needle Cover
132	"	Screw

9-(4) Parts List with Specified Numbers for Designated Areas

Item No.	Description	U.S.A. & Canada	Europe	U.K.	Australia	U.S. Military Market and Other Countries
1	Cabinet Ass'y	E22339-001	E22339-003	E22339-002	E22339-003	E22339-003
1-1	Cabinet	E10173-001	E10173-003	E10173-002	E10173-003	E10173-003
3	Tonearm Ass'y	ARM-518	MP-174S	ARM-518	MP-174S	MP-174S
18	Power Transformer	E03032-23B	E03032-23C	E03032-23CBS	E03032-23C	E03032-23D
22	P.C. Board Ass'y	TPS-96J(U.S.A) TPS-96N(Canada)	TPS-96L	TPS-97ABS	TPS-96M	TPS-96K
23	Fuse	QMF61U2-R30 (0.3A)	QMF51A2-R10 (0.1AT)	QMF51A2-R10BS (0.1AT)	QMF51A2-R10 (0.1AT)	QMF60S1-R30 (0.3A) or QMF60R1-R20 (0.2A)
24	Fuse	———	QMF51A2-R50 (0.5AT)	QMF51A2-R50BS (0.5AT)	QMF51A2-R50 (0.5AT)	———
25	Fuse Label	E61378-013	———	———	———	E61379-019
28	Turn Table Covering	E22375-004	E22375-003	E22375-003	E22375-003	E22375-003
31	Power Cord	QMP1200-244	QMP3910-244	QMP9017-007BS	QMP2500-200	QMP1200-244
39	Bottom Board Ass'y	E22342-003	E22342-004	E22342-004	E22342-004	E22342-006
40	Foot Ass'y	E35118-002	E35118-001	E35118-001	E35118-001	E35118-001
91	Timing Motor	EE35032-002	E35032-003	E35032-003BS	E35032-003	E35032-002
95	Micro Switch	QSM1V01-018	QSM1V01-022	QSM1V01-022BS	QSM1V01-022	QSM1V01-018
96		QSM1V01-019	QSM1V12-101	QSM1V12-101BS	QSM1V12-101	QSM1V01-019
97		QSM1V01-013	QSM1V11-101	QSM1V11-101BS	QSM1V11-101	QSM1V01-013
129	Cartridge	———	MD-1025	———	MD-1025	MD-1025
130	Needle Ass'y	———	DT-Z1TE	———	DT-Z1TE	DT-Z1TE
131	Needle Cover		E34268-001		E34268-001	E34268-001
132	Screw	E60502-002	———	E60502-002	———	———

(Table 1)

10. Printed Circuit Board Ass'y and Parts List

10-(1) TPS-96 Power Supply P.C. Board Ass'y

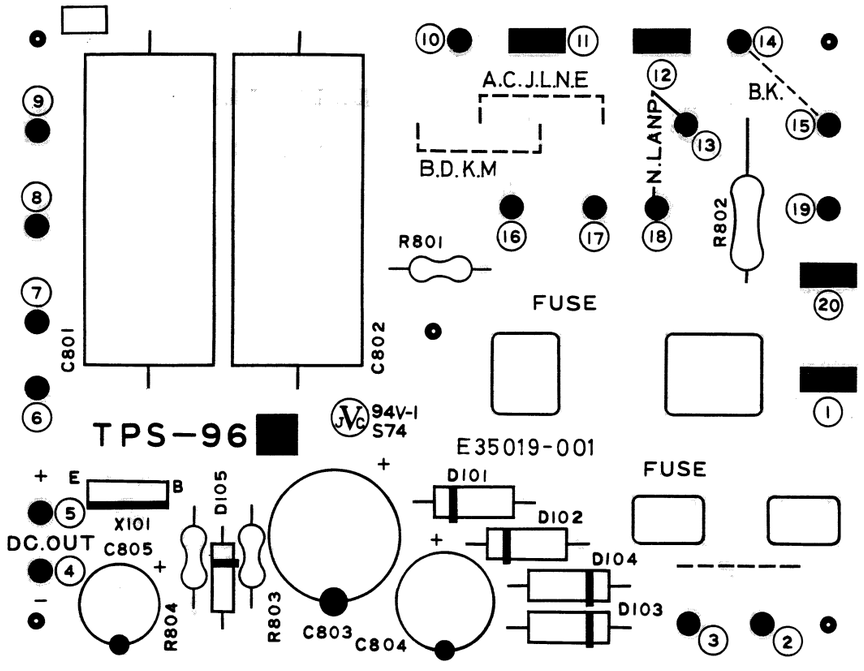


Fig. 30

Applies to : TPS-96J (for U.S.A and Canada)
TPS-96L (for Europe)
TPS-96M (for Australia)
TPS-96K (for U.S. military Market and Other Countries)

Transistor

Item No.	Part Number	Rating		Description	Maker
		Pc	fT		
X101	2SD325(E)	10 W	8MHz	Silicon	Sanyo

Diodes

Item No.	Part Number	Rating	Description	Maker
D101~D104	SIB01-02		Silicon	Fuji Denki
D105	WZ-192		Zener	Shin Nihon Musen

Capacitors

Item No.	Part Number	Rating		Description
C801	See page 21	0.047μF		(Refer to table 2)
C803	QEW41VA-477M	470μF	35V	Electrolytic
C804	QEW41VA-107	100μF	35V	"
C805	QEW41HA-476	47μF	50V	"

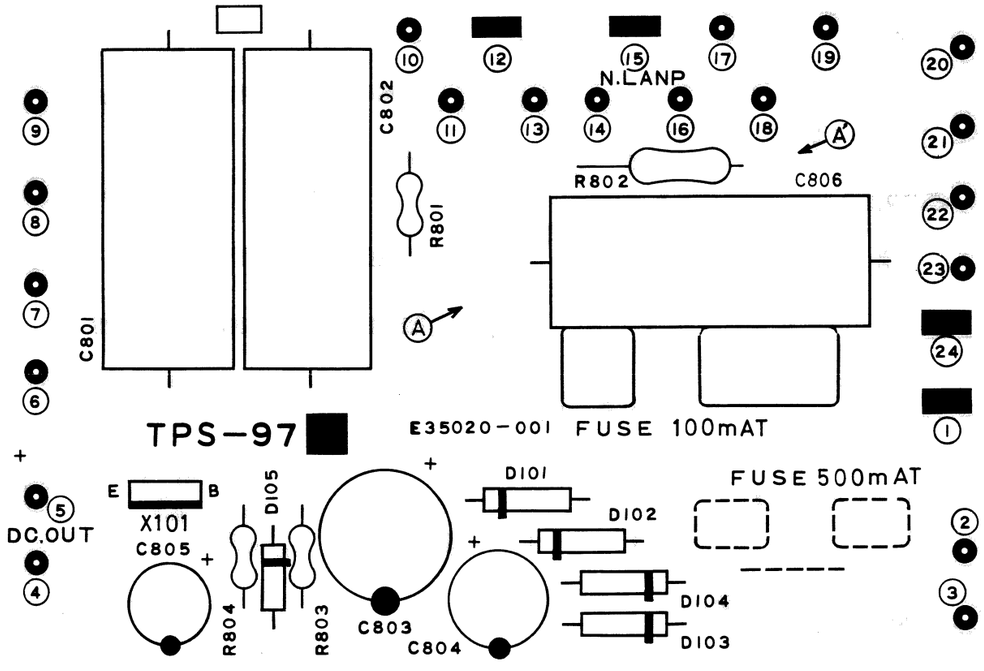


Fig. 31

Applies to : TPS-97A (for U.K.)

Resistors

Item No.	Part Number	Rating		Description
R802	QRG017J-153S	15kΩ	1W	Uninflammable O.M.
R803	QRG129J-681	680Ω	½W	"
R804	QRX129J-100	10Ω	½W	"

Others

Item No.	Part Number	Rating	Description
	See page 21		Circuit Board (Refer to table 2)
	E43727-002		Tab
	E40130		"
	See page 21		Fuse clip (Refer to table 2)

10-(2) MDC-933A Servo Control P.C. Board Ass'y

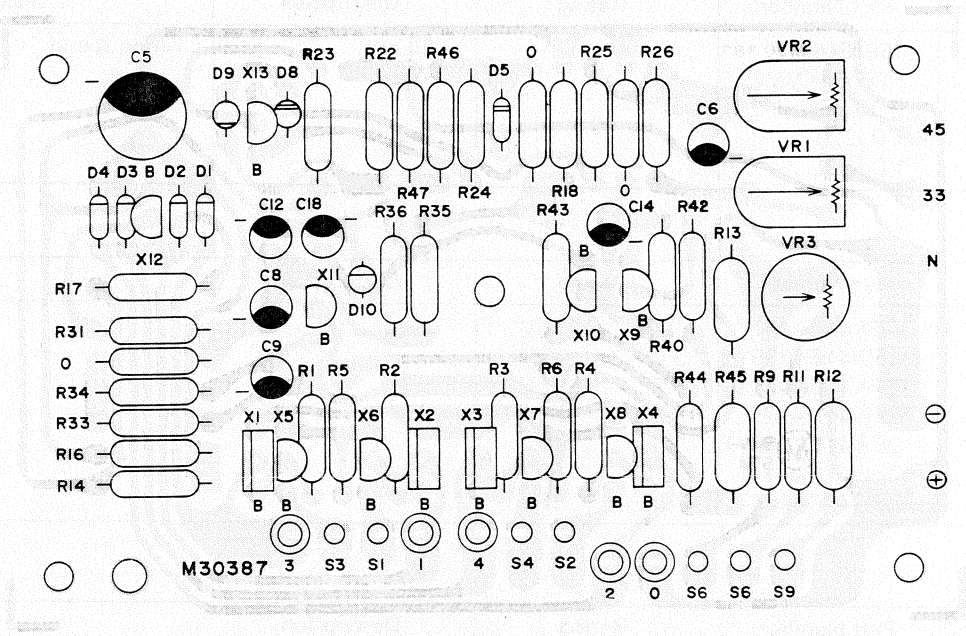


Fig. 32

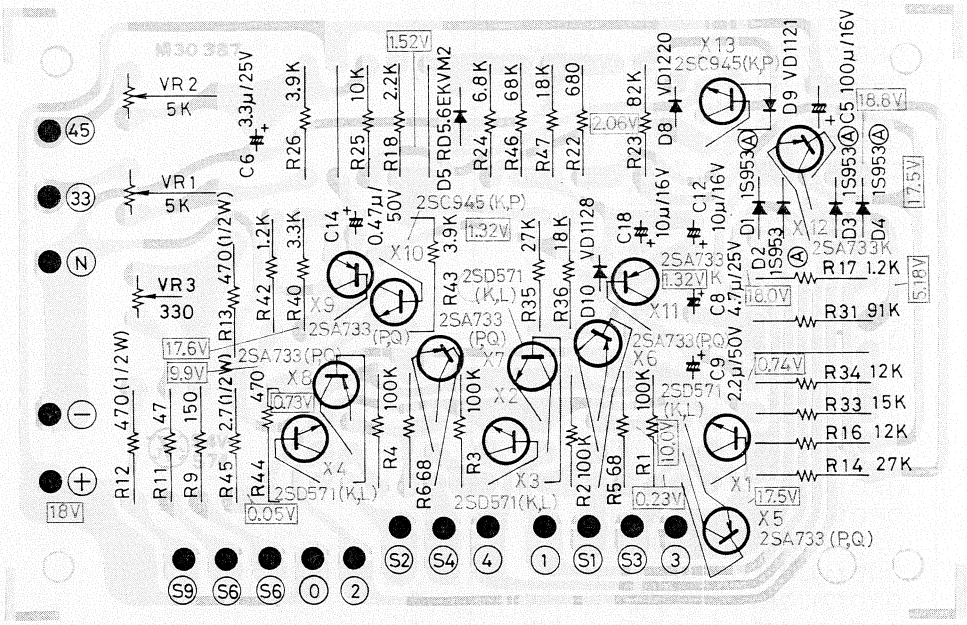


Fig. 33

Transistors

Item No.	Part Number	Rating		Description	Maker
		Pc	fT		
X1~X4	2SD571(K,L)	800mW	110MHz	Silicon	Nihon Denki
X5~X9	2SA733(P,Q)	250mW	180MHz	〃	〃
X10	2SC945(K,P)	〃	250MHz	〃	〃
X11~X12	2SA733(K)	〃	180MHz	〃	〃
X13	2SC945(K,P)	〃	250MHz	〃	〃

Diodes

Item No.	Part Number	Rating	Description	Maker
D1~D4	1S953(A)		Silicon	Nihon Kenki
D5	RD5.6EKVM2, RD6.2EK M2		Zener	" "
D8	VD1220		Varistor	"
D9~D10	VD1121		"	"

Capacitors

Item No.	Part Number	Rating		Description
C5	QEW41CA107	100F	16V	Electrolytic
C6	QEW41EA335	3.3F	25V	"
C8	QEW41EA475	4.7F	25V	"
C9	QEW41HA225	2.2F	50V	"
C12	QEW41CA106	10F	16V	"
C14	QEW41HA474	0.47F	50V	"
C18	QEW41CA106	10F	16V	"

Resistors

Item No.	Part Number	Rating		Description
R1~R4	QRD141J-104	100kΩ	¼W	Carbon
R5~6	QRD141J-680	68Ω	"	"
R9	QRD141J-151	150Ω	"	"
R11	QRD141J-470	47Ω	"	"
R12~R13	QRD121J-471	470Ω	½W	"
R14	QRD141J-273	27kΩ	¼W	"
R16	QRD141J-123	12kΩ	"	"
R17	QRD141J-122	1.2kΩ	"	"
R18	QRD141J-222	2.2kΩ	"	"
R22	QRD141J-681	680Ω	"	"
R23	QRD141J-823	82kΩ	"	"
R24	QRD141J-682	6.8kΩ	"	"
R25	QRD141J-103	10kΩ	"	"
R26	QRD141J-392	3.9kΩ	"	"
R31	QRD141J-913	91kΩ	"	"
R33	QRD141J-153	15kΩ	"	"
R34	QRD141J-123	12kΩ	"	"
R35	QRD141J-273	27kΩ	"	"
R36	QRD141J-183	18kΩ	"	"
R40	QRD141J-332	3.3kΩ	"	"
R42	QRD141J-122	1.2kΩ	"	"
R43	QRD141J-392	3.9kΩ	"	"
R44	QRD141J-471	470Ω	"	"
R45	QRD121J-2R7	2.7Ω	½W	"
R46	QRD141J-683	6.8kΩ	¼W	"
R47	QRD141J-183	18kΩ	"	"
VR1~VR2	QVP8A0B-053	5kΩ		Variable Resistor
VR3	QVP4A0B-331	330Ω		"

Others

Item No.	Part Number	Rating	Description
	M30387		Circuit Board
	M40244		Tab
	QXT310H-015		Vinyl Tube
	M40243-2	6φ x 12mm	Silicon Tube

10-(3) Parts List with Specified Number for Designated Areas

Item No.	Description	U.S.A. & Canada	Europe	U.K.	Australia	U.S. Military Market and Other Countries
	Power Supply P.C. Board Ass'y	TPS-96J (U.S.A.) TPS-96N (Canada)	TPS-96L	TPS-97A	TPS-96M	TPS-96K
	Power Supply P.C. Board (Plain)	E35019-001	E35019-002	E35020-001BS	E35019-002	E35019-002
	Fuse Clip	E45524-001	E48965-002	E48965-002	E48965-002	E45524-001
	Fuse (Primary)	QMF61U2-R30 (0.3A)	QMF51A2-R10 (0.1A)	QMF51A2-R10BS (0.1A)	QMF51A2-R10 (0.1A)	QMF61U2-R30 (0.3A/110,120V) QMF61U2-R20 (0.2A/220,240V)
	(Secondary)	———	QMF51A2-R50 (0.5A)	QMF51A2-R50BS (0.5A)	QMF51A2-R50 (0.5A)	———
C801 or C802	Capacitor	QFH72BM-473M (U.S.A. 0.047μF/AC125V) QFA72BM-473M (Canada 0.047μF/AC125V	QFZ9007-473 (0.047μF/AC450V) QFZ9007-103 (0.01μF/AC450V)	QFZ9007-473 (0.047μF/AC450V) QFZ9007-103 (0.01μF/AC450V) QFZ9007-473M (0.047μF/AC450V)	QFZ9007-473 (0.047μF/AC450V) QFZ9007-103 (0.01μF/AC450V)	QFH53AM-473M (0.047μF/AC450V) QFH53AM-103M (0.01μF/AC450V)
R801	Resistor	———	QRG129J-102 (1k ohm/1/2W)	QRG129J-102 (1k ohm/1/2W)	ARG129J-102 (1k ohm/1/2W)	———
R802	Resistor	QRG017J-153S (15k ohms/1W)	QRG027J-333 (33k ohms/2W)	QRG027-333 (33k ohms/2W)	QRG027J-333 (33k ohms/2W)	QRG017J-103S (10k ohms/1W)

(Table 2)

11. Packing Materials and Part Numbers

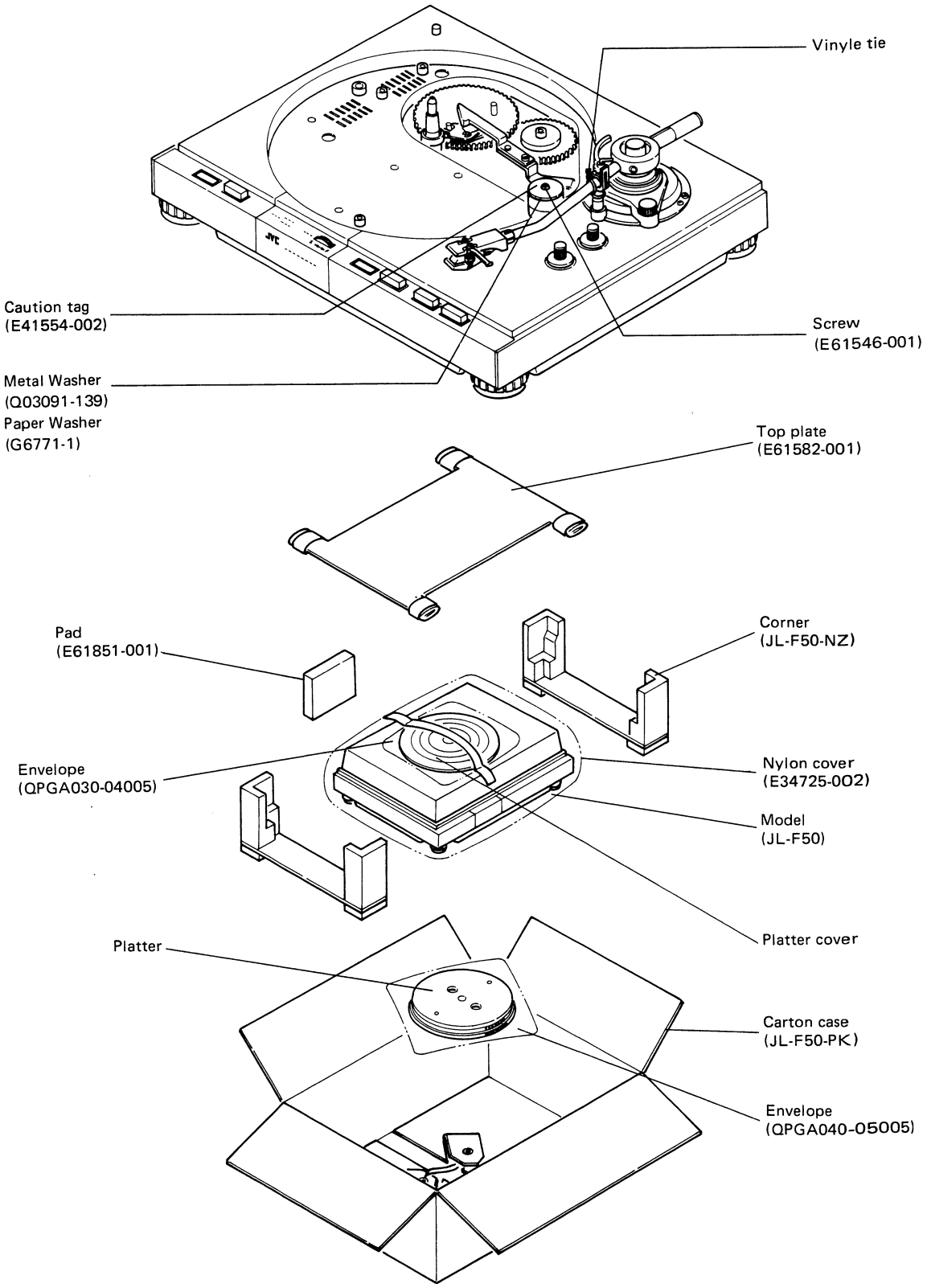
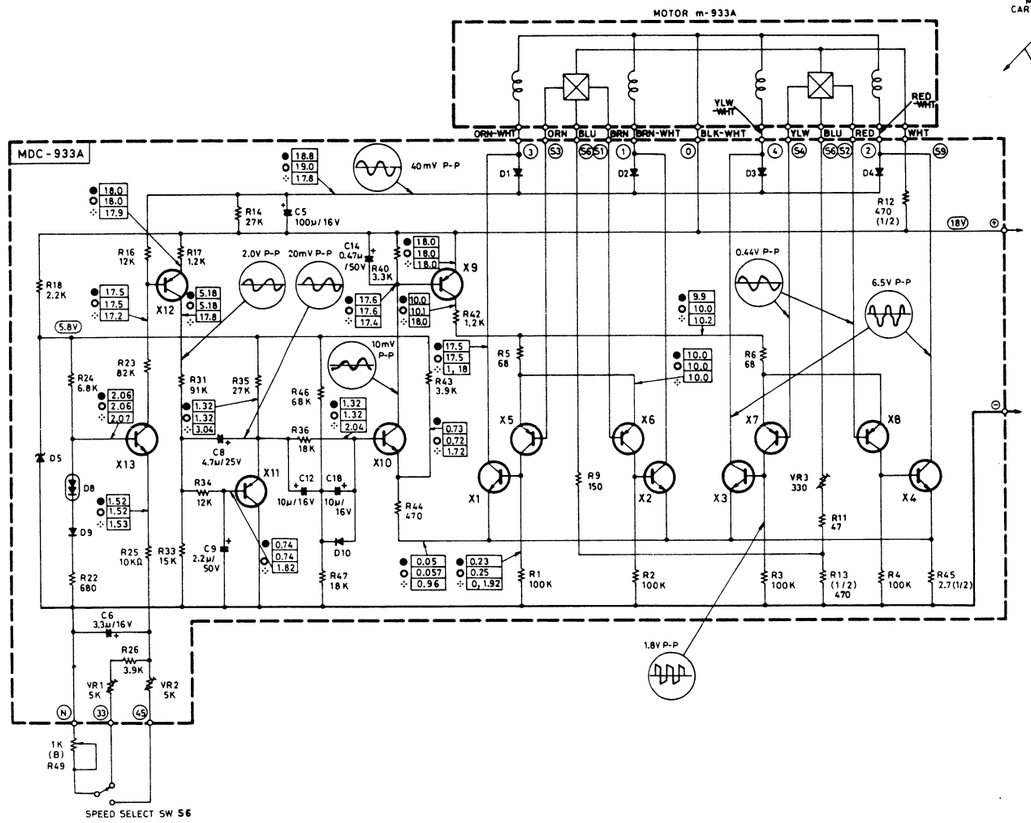
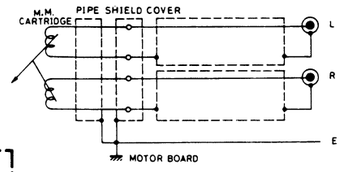
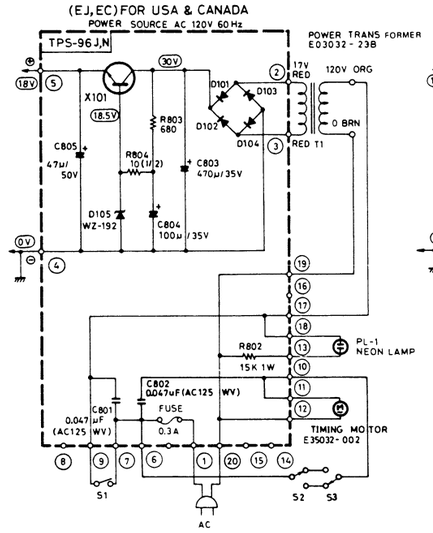


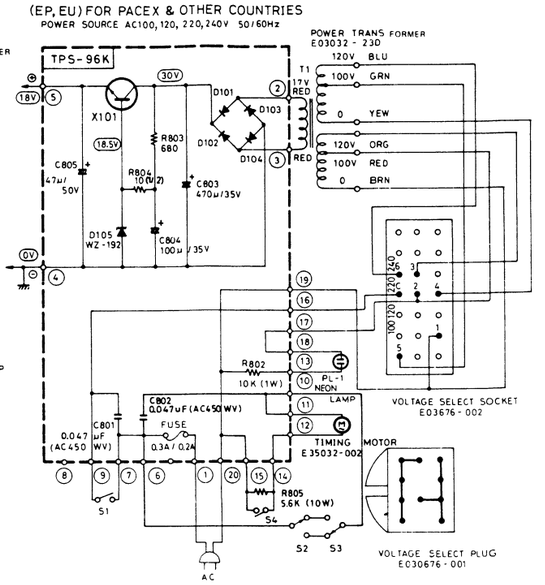
Fig. 34

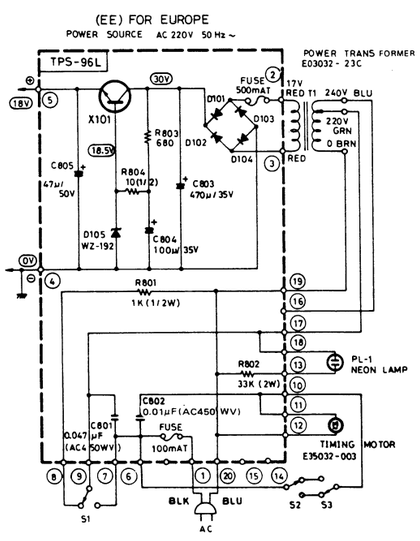
12. JL-F50 Schematic Diagram

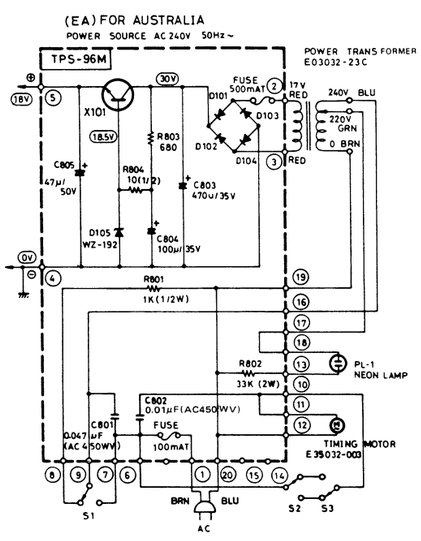


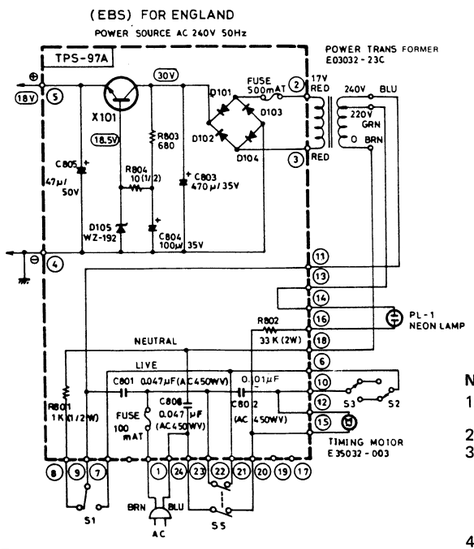


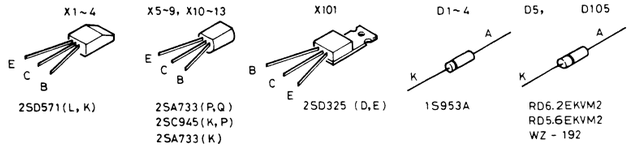



(EP, EU) FOR PACEX & OTHER COUNTRIES
POWER SOURCE AC100, 120, 220, 240V 50/60Hz
TPS-96K
POWER TRANS FORMER E03032-23D
VOLTAGE SELECT SOCKET E03676-002
VOLTAGE SELECT PLUG E03676-001
TIMING MOTOR E35032-002









X1~4	2SD571 (L,K)	X101	2SD325 (D,E)
X5-9	2SA733 (P,Q)		
X10 X13	2SC945 (K,P)		
X11 X12	2SA733 (K)		
D1~4	1S953Ⓐ	D101~104	S1B01-02
D5	RD6.2EKVM2	D105	WZ-192
D8	VD1220		
D9 10	VD1121		

Notes:

1. Hall elements (⛒) and D11 (VD1121) are installed inside the motor, and not in included in the motor drive and power circuits.
2. D1 through D4 should be of the same rank having an equal hfe.
3. The indicated voltages are measured by a tester having an internal impedance of 20k ohms/V.
   - ● when locked
   - O for 33-1/3 rpm
   - ※ for 45 rpm
4. Circuits and circuit constants are subject to change without notice for improvement.

Fig. 35

13. Accessories List

Description	U.S.A. & Canada	Europe	U.K.	Australia	U.S. Military Market and Other Countries
Inst. Book	E30580-619A (U.S.A) E30580-619A, E30580-621A (Canada)	E30580-619A E30580-620A E30580-621A	E30580-619A	E30580-619A	E30580-619A
Warranty Card	BT20032 (U.S.A.) BT20025 (Canada)	———	BT20013BS	BT20029	BT20014 (U.S. Military market only)
Do it Better	BT20025B (U.S.A. only)	———	———	———	———
Service Procedure	BT20023 (U.S.A. only)	———	———	———	———
Envelope (for Inst. Book)	E64207-001	E64207-001	E64207-001	E64207-001	E64207-001
EP Adaptor	E48820-001	E48820-001	E48820-001	E48820-001	E48820-001